The MAC Flyer

MAY 1972

Flying Can Be Fun

Flicker Vertigo

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For Greater Efficiency
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The MAC Flyer

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COVER: USAF aero clubs permit members to enjoy safe, low cost, light plane flying. Our lead story this month tells how they do it.

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Squawk Box

"Hurrah, hurray for the first of May — Outdoor necking starts today!"

So goes the old college ditty. May is a great month: flowers, baseball, short sleeves, Mom's Day, the Combat Airlift Competition, and the start of the big annual people shuffle.

Yes, May brings the beginning of the summer personnel turbulence and shortages. New bodies are still inbound; old heads are starting to pack their bags and make one last visit to their kinfolks. In summer our supervision and experience are spread a lot thinner.

So, what does all that mean to me as I sit in my sweltering HH-43 or ford the puddles on my way to my drenched C-141? Hopefully, very little — *if* we're lucky. But there's a very good chance that things won't go as smoothly as usual during the next few months. The fine coordination we once had with our ground crew may not be as good, with Chief Sharpbody gone, and Airman Newguy learning the ropes. Weather briefings may be slower as the new forecaster takes longer to answer your questions. The ten-minute maintenance problem may take fifteen as the sharp tech with the wrench helps train the three-level looking on.

These are little things, and because they are small we probably won't see much of a change as summer arrives. On the other hand, a lot of little things can quickly add up to a moderate delay or frustration.

Possible solutions? Know the enemy. Allow extra time for each job. Help train the new lads. Be patient. And smile — the determination to enjoy life will be contagious.

The mission of the United States Air Force is to fly and fight. For aero clubs, the purpose is a little different.

Flying Can Be Fun

by Lt Col Herb Petrak
MAC/IGE

MENTION AERO CLUBS to people in the Air Force and you'll get a variety of reactions. Line pilots, remembering traffic delays caused by light airplanes in the pattern, will probably make some snide comments about "bug smashers." Base operations officers, who must allow for aero club flying in the base traffic patterns, might also be a little unkind.

But many other people will offer a more favorable response. You'll hear mention of flying family vacations, week-end trips to places too far away to drive to, and the sheer enjoyment of flying for fun. You'll hear of a return to the grass-roots level of aviation and a chance to once again experience the freedom of flying — unbound by mission requirements, command post directives, and scheduled takeoff times. You might even hear aero-clubbing described as a chance — in our highly organized and directed society — for a man to once again exercise his freedom in the most exciting dimension of all: flight. Aero clubs mean many things to many people.

The purpose of Air Force aero clubs is to permit members to enjoy safe, low cost, light aircraft operations while developing skills in aeronautics and an awareness and appreciation of aviation. As an additional benefit, aero clubs provide a social activity for members. Let's take a look at these clubs, their organization and operations, and see how they achieve their purpose.

AFM 215-8 contains the basic guidance for Aero Clubs. This comprehensive little book covers everything from how to start a club, all the way down to specific details and procedures for training, standardization, and flight operations. Although this manual has been critized for being overly restrictive, our experience has shown that the guidance it contains is definitely needed.

Aero club accident rates have been — and still are — much better than general aviation's, but aero club history has been spotted with accidents. Far too many of these mishaps were needless. Poor supervision, bad judgment, and even flagrant disregard of basic flying principles have cost us

dearly. It's not surprising that the Air Force, in AFM 215-8, says, in effect, that aero clubs will be properly supervised and operated safely or they will not operate.

Organization

Each aero club is directed by a board of governors, a group of five to eleven men who serve in their free time. Many board members have a specific area of responsibility, such as maintenance, supply, operations, or safety. But even more important than being experts in their fields, board members must be willing and able to devote considerable time to their club duties. Mistakes by the board of governors can put a club completely out of business.

For example, the board could decide to buy an expensive new IFR-equipped airplane. Fixed costs on the airplane, such as insurance, depreciation, interest on loans, and others, go on month after month. If the club members can't afford to fly the new aircraft enough to pay these costs, the club will soon be in serious financial trouble.

The board must also act as the eyes and ears of the commander. When situations come up which the board cannot control and which will affect the club, the board must ensure the commander is kept informed.

The club manager, a full-time paid employee who works directly under the board of governors, is probably the single most important member of the aero club team. He directs the day-to-day operations of the club and deals with each individual member at one time or another. He has to maintain a harmonious working relationship among the individual club members, the club instructors, and the board of governors.

It costs money for people to join and participate in aero club activities — money that is essential if the club is to remain active. Because of this, the club manager must actively sell the club to prospective members and make certain that flying members enjoy the club's activities.

It's quite a job — not one for someone who wants to take it easy during working hours and forget about it at other times. A good manager must have tact, perseverance, the ability to get along with all types of people, and absolute loyalty to the club and its needs.

Operations

Now that we've an idea of how aero clubs are organized, let's take a look at aero club rules of operations. Basically, of course, aero club flying is conducted under Federal Aviation Administration (FAA) directives. While these rules are sound,

USAF has found it necessary to develop additional guidelines which parallel the FAA regulations but are more restrictive.

These Air Force rules are contained in AFM 215-8 which we mentioned earlier. They are the reasons the manual has been criticized for being too restrictive. However, if we examine several of the so-called excessively restrictive rules, I think you'll see that the restrictions make very good sense.

All aero club pilots must have an annual standardization check flight. This rule raised more than a few eyebrows. "What for?" some people asked. "We're not professional pilots. Why should we have standardization checks?" The annual standardization check is designed to *help* aero club pilots — not to trap or harass them. For a long time professional pilots — both in and out of the military — have recognized the value of having another qualified pilot observe their performance occasionally. Military pilots take two or three check flights a year and so do airline pilots. During these flights, the check pilot often can point out mistakes or bad habits which the pilot never noticed. Also, the check pilot can sometimes suggest a better way of doing something and offer other handy hints. It's actually a learning situation.

Presently, the FAA does not require check flights for general aviation pilots after they have received their licenses. There are some light plane pilots who have not flown with an instructor or check pilot in 15 or 20 years — and who have probably not learned anything about flying in about the same period of time. However, the FAA is aware of the benefits of check flights and is considering them for general aviation pilots. The present proposal is for a flight check every two years, but it's not required yet.

Another example: For currency, an aero club private pilot with less than 200 hours total time must make 5 landings and log at least one hour of flight time every 60 days, before he can carry passengers or fly solo. The FAA only requires 5 landings every 90 days to carry passengers; there is no solo currency requirement. Technically, as long as he keeps his medical certificate current, a civilian private pilot who hasn't flown anything in 10 years, can fly solo, make only 5 landings, and then be completely legal to carry passengers! Yes, aero club rules are more restrictive than this, but overly restrictive? Hardly.

Another rule that has caused some heartburn is the requirement for a two-hour dual cross-country checkout for pilots who have not had light aircraft cross-country experience in the last two years. Some C-141 pilots, with 10,000 hours of "flying the heavies," have taken a little offense at this requirement. However, most of them realize that a Cessna doesn't respond like a Starlifter, and the navigational aids available are not the same either. Even the captain of an ocean liner would probably need a little instruction before he tried to paddle a canoe across a lake — it's not hard; it's just not what he's used to.

Aero club rules *are* more restrictive than they once were. But the changes have been necessary and will provide greater safety and enjoyment for club members. Aero club flying should be fun, but there's nothing fun about tearing up an airplane and injuring or killing people.

The Ideal Aero Club

The perfect aero club must be able to meet the needs of all its members. It must have something for everyone, from the zero time student pilot to the 10,000-hour professional, and for any experience level between these extremes. The student pilots will need some nice, simple training planes; two or three Cessna 150s will do nicely. Then there should be some fairly fast four-place, IFR-equipped airplanes for week-end trips: a couple of Beechcraft Bonanzas or Piper Comanches perhaps. The club should also have some twin-engine airplanes for members who like multi-engines: some Cessna 310s or Aero Commanders. There should also be a few old military trainers for those that would like to play fighter pilot on the week ends: a T-6 perhaps or a PT-22. To round the whole thing off, the club should have a couple of 450-horsepower Stearmans for the aerobatic nuts.

The club should also have money enough so it can afford to rent any of these airplanes for about five dollars an hour — including fuel — and offer cheaper rates for extended cross-country flights.

Incidentally, if you come across a club like this, would you let me know? I'd like to join it.

Part way between crossed fingers and fancy multi-bar VASIs, there is a suitable approach slope indicator for light plane operations. It's called . . .

Poor Man's VASI

Adapted from Aerospace Safety

IN MILITARY FLYING, we seldom make landing approaches without glide path information. Even in good weather we normally use GCA or monitor the ILS, and during visual approaches we usually have VASI. As a result, it sometimes seems that a plain-vanilla, visual landing — where you look at the runway and then land on it — is almost an emergency procedure. (In fact, that's probably not a bad concept.)

But in light plane landings, glide path information is the exception rather than the rule. Most light airplanes don't have ILS receivers and many of the airports from which they are operated are VFR only and not equipped with instrument approach aids or VASI. This may explain the high incidence of light plane accidents during final approach and landing.

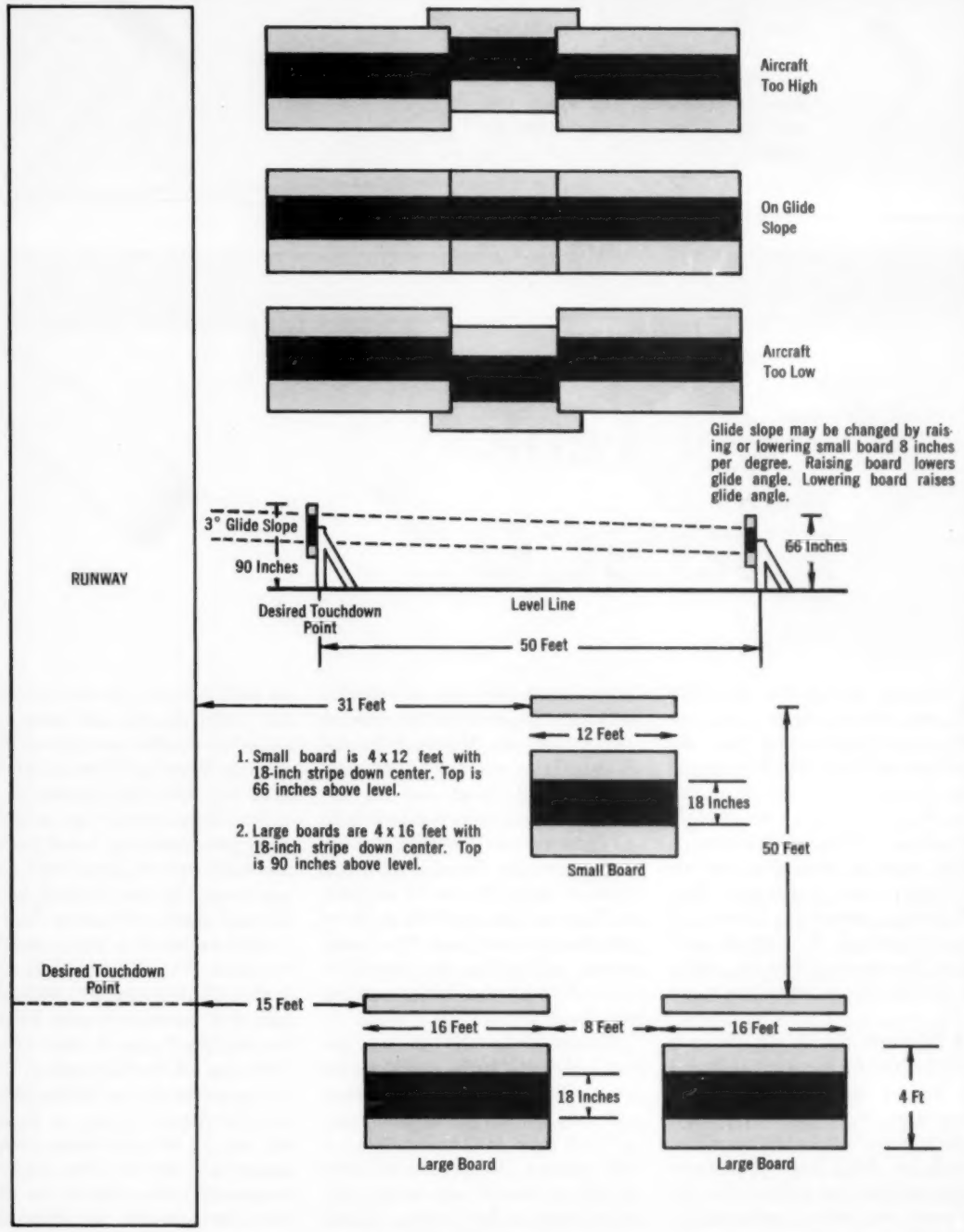
An accurate glide slope reference of some sort is a nice thing to have while preparing to land any aircraft. Illusions during a landing approach can be just as much a problem in a Cessna 172 as in a C-5. Unusual conditions, like flying final approach into a setting sun, can obscure visual clues and tax the skill of any pilot no matter how highly trained or proficient. Additionally, low-time student pilots, who do not yet have a firm grasp of the final approach "picture," can use a visual approach aid while they're learning what a good approach looks like. What's needed is a cheap, accurate visual approach aid, and — surprisingly — such a device exists. The accompanying sketch shows it in detail.

This Poor Man's VASI was originally developed by the Navy for use at small forward airfields. The system, which looks like three billboards, can be constructed mainly of plywood and installed at very little cost. The dimensions on the drawing establish a reference for a three-degree glide slope, but this can be varied if necessary.

Strongly contrasting colors should be used for the painted stripes. Black and white sound logical, until you consider that the colors must not only contrast with each other but also with the terrain behind them. White wouldn't show up too well against snow. Black and either orange or yellow would probably be better.

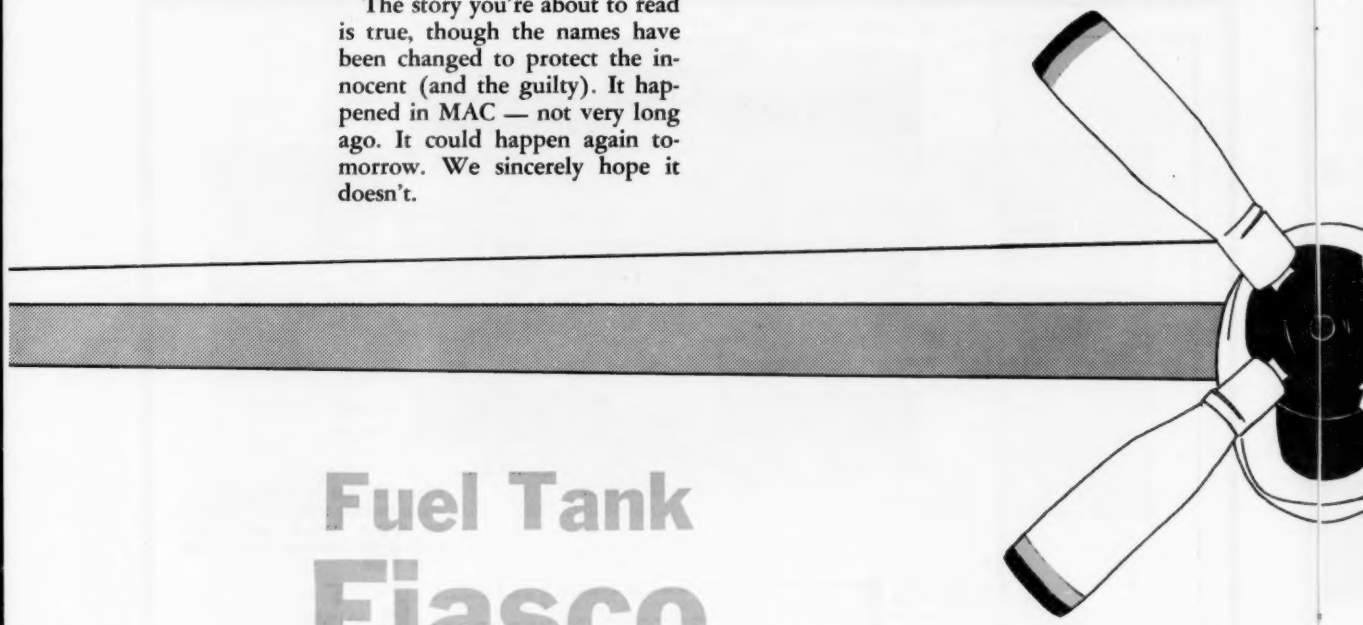
While the boards must be mounted securely enough so strong winds won't uproot them, we don't recommend making them out of half-inch boiler plate and bolting them to six-inch angle iron. Remember, they will be located near the runway, and a light airplane making an inadvertent excursion to the boondocks should be able to knock them down.

While the Poor Man's VASI comes off second best to the light bars installed at regular MAC bases, within its limitations it can be a useful tool. It can furnish accurate glide slope information from about one-half to one mile on final approach, and the large boards mark the desired touchdown point. In a low-performance light airplane, while landing on a short, unpaved strip, that information can be a real help.



POOR MAN'S VASI

The story you're about to read is true, though the names have been changed to protect the innocent (and the guilty). It happened in MAC — not very long ago. It could happen again tomorrow. We sincerely hope it doesn't.



Fuel Tank Fiasco

AT ABOUT 1730 LOCAL, Sgt Alpha and Airman Bravo from the base fuel cell repair shop were dispatched to replace a fuel level control valve inside the fuel tank of an HC-130. When they got to the aircraft, they discovered that an air blower — which would be required to ventilate the tank — was inoperative. They called for a second air blower but when it arrived, it wouldn't work either. The two men then left, taking the first air blower with them to try to fix it.

A little later, Sgt Charlie, the crew chief, arrived for the night shift and saw that his aircraft was still out of commission. Impatient with the delay, he decided to do the work himself — though he didn't have the proper equipment, was not authorized to do the work, and had no assistance. He opened the fuel tank and climbed in.

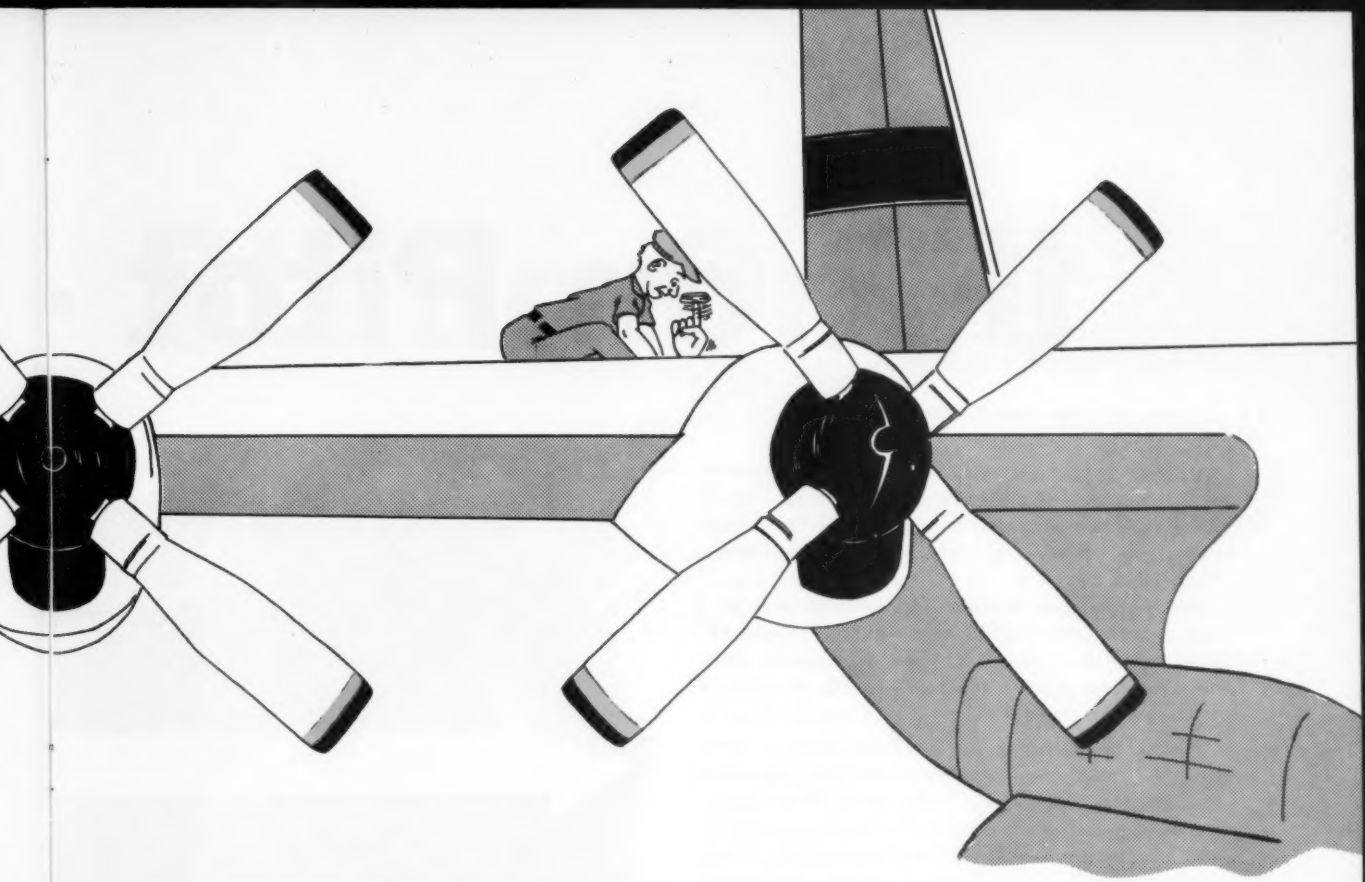
After about five minutes inside the tank, Sgt Charlie began to feel a little light-headed, so he climbed back out. He then left the aircraft and rounded up Airman Delta and Airman Echo, two night shift workers. He told them what he was doing and said he needed their help. All three men went back to the aircraft, where they found an AGE man trying to repair the second air blower. Airman Delta said he'd go ahead and start to work and Sgt Charlie agreed, adding that they would get air to him as soon as the machine was fixed.

Airman Delta climbed into the fuel tank, Sgt Charlie stayed on the wing and talked to him as he worked, and Airman Echo got in the dry bay to hand tools to Airman Delta. A few minutes later Airman Delta needed a wrench which the men didn't have, so Sgt Charlie left and went to his tool box to get one. When Sgt Charlie got back to the aircraft he found Airman Echo trying to talk to Airman Delta, who was still inside the fuel tank and had become incoherent. By this time it was 1900; Airman Delta had been in the fuel tank for about five minutes.

Sgt Charlie quickly ran to an aircraft parked nearby, called the control tower and requested help. As he ran back to his own aircraft, he met the line chief and Airman Fox. Sgt Charlie explained to them what had happened. The three men then ran to Sgt Charlie's aircraft, where Airman Fox replaced Airman Echo in the dry bay to try to coax Airman Delta out of the fuel tank.

Fire trucks arrived within minutes and the firemen, trying to improve the air in the fuel tank, pumped oxygen into the fuel filler port. Unfortunately, this forced the fuel fumes into the dry bay where they quickly overcame Airman Fox.

In a few minutes, the flight surgeon arrived and Airman Fox was



removed from the dry bay. Then the flight surgeon and Airman Golf from the fire department entered the dry bay and tried to get Airman Delta out of the fuel tank. They tried to pull him out by his feet, but Airman Delta resisted by kicking and hanging onto the wing braces. The flight surgeon considered giving Airman Delta a sedative but decided against it because he wasn't sure Airman Delta could be removed from the fuel tank while unconscious. The flight surgeon then climbed out of the dry bay and left Airman Golf, who was wearing a respirator, to continue trying to get Airman Delta out of the tank.

Airman Golf finally removed his respirator so he could talk to Airman Delta while he continued trying to pull him out. Airman Delta then kicked Airman Golf in the face. As a result, Airman Golf made what could charitably be called some derogatory remarks to Airman Delta. Airman Delta got angry and started coming toward Airman Golf. As Airman Delta came part way out of the fuel tank, members of the fire department and the flight surgeon grabbed him and pulled him out onto the wing where he was given 100 percent oxygen.

In about 15 minutes, Airman Delta was well enough to help himself climb down from the wing and get into the ambulance. In the emergency room of the hospital he was still euphoric and had some muscular instability, but was in apparently good condition. He had been exposed to the fumes for almost one hour. Airmen Golf and Fox, who had been exposed for about 15 minutes each, were both dazed but in good condition. All three men were admitted to the hospital for observation and released for duty the next day.

This incredible episode uncovers a series of errors so gross it might be funny if it hadn't come so close to being tragic. Almost everyone involved completely disregarded the established safety procedures outlined in AFM 127-101, TO 1-1-3, and the 6R8 series. Sgt Charlie violated basic flight-line maintenance discipline by not notifying the line chief of the work he was performing. He also exercised very poor judgment by attempting to perform a job which two qualified individuals had refused (because of the inoperative air blower), and committed a supervisory error by having Airman Delta attempt the same job. Finally, there was poor judgment on the part of Airman Delta, who did not attempt to refuse the order to work in an environment which he knew was unsafe.

* * *

Altogether, this was a pretty dismal showing.

IFR on Pitot ..

by Maj Walter Burkett

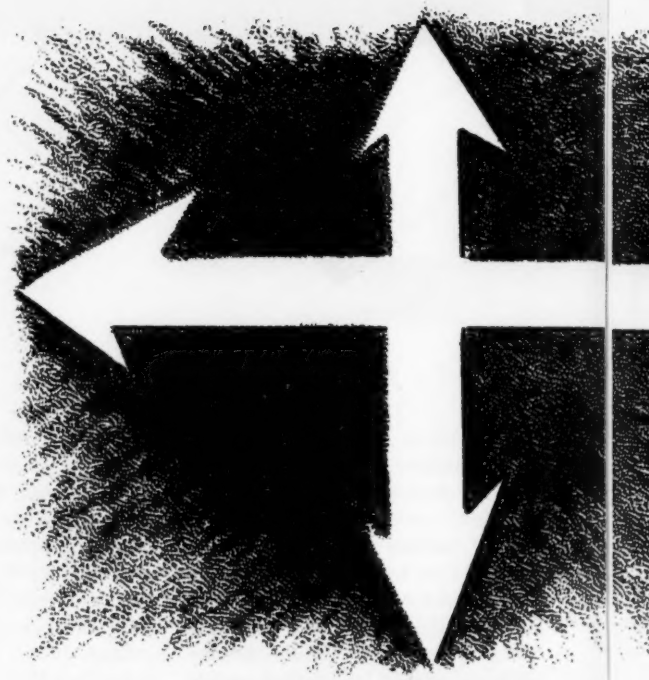
WHILE ON LEAVE BETWEEN ASSIGNMENTS a few months ago, I had the opportunity to obtain an FAA Instrument Flight Instructor rating. One of the requirements was successfully completing a comprehensive flight check.

During the flight check the FAA examiner gave me a hypothetical flight situation and asked how I would cope with the problem. Now, most questions posed by examiners are quite routine and hardly worth reporting in detail. But this one was unique — and very challenging.

Here is the problem: You are flying above a 5,000-foot solid cloud layer on an instrument flight. The ceiling is 2,000 feet, and visibility is five miles. There are no mountains or other obstructions to be concerned with. You have plenty of fuel. But you have just had a *complete* electrical failure (everything: battery and generator): your attitude indicator, turn needle, and heading indicator are inoperative. You still have your pressure instruments (altimeter, airspeed, vertical velocity). You don't have a parachute so you have to bring the aircraft down through the soup. How can it be done?

Needless to say, to have this thrown at you on a check is guaranteed to be slightly unnerving (added to the customary checkitis). I would have said such a maneuver couldn't be done. Racking my mind for an answer, I thought back over my years of flying and tried to recall something from all the instrument schools I had attended. After a couple of minutes I suggested that with the conditions he gave, and with no way of determining bank once I entered the clouds, I would put the aircraft into a deliberate spin. In the spin, I'd descend through the cloud deck and then recover beneath. Remember, I had 2,000 feet of VFR altitude underneath — plenty for the light aircraft in which I was taking my check. Of course, in doing this I would avoid the deadly spiral which can tear the wings off an aircraft. (Believe it or not, a spin exerts relatively minor forces on an aircraft.)

The FAA examiner nodded and said that was one satisfactory way of getting out of the dilemma — but he described it as a rather traumatic solution! I allowed as how he was right.

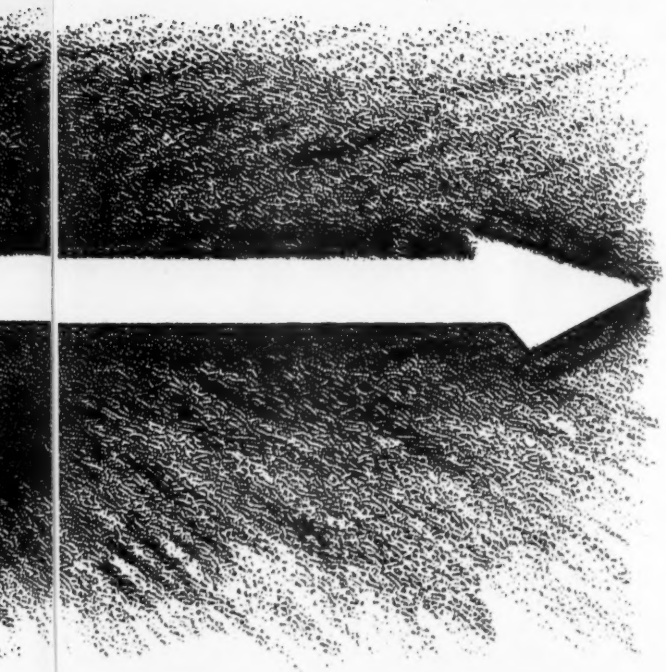


Then he asked if I had any other instrument in the aircraft that I might use to allow myself to come down in a safer, more controlled manner. More concentration, then I admitted defeat and asked for the answer. He replied, "The *magnetic compass* — it's required in all aircraft and it can be used as a wings-level indicator."

I started thinking as fast and hard as I could about how a mag compass operates. I had already boned up on lead and lag; acceleration and deceleration errors; dip errors; and deviation errors. Knowing these things was a necessity for the written examination and the pre-flight oral examination. But to use the compass as an instrument to which I would trust my life? Can *you* figure it out? How would you use the magnetic compass as a wings-

Static Only?

Reprinted from Airscoop



level indicator that is meaningful to you as a pilot under the above conditions? Don't feel too bad if you can't figure it out. You aren't alone!

At this point you are probably asking yourself how all this is going to be of use in your C-141, C-130, H-3, T-29 or whatever. Obviously the spin solution isn't of much help for these aircraft, but what follows might — some day, somewhere, sometime — be of use to you. I'll be the first to admit that *complete* electrical failure is remote. But it can happen, so having an extra technique in your bag of emergency solutions shouldn't hurt. (Of course, some of you can always bail out.)

From your gage-flying training you know that a heading indicator is the primary instrument for bank in instrument flight. Assuming you are coordinated, if the heading is changing, the aircraft is in a bank. It follows, then, that if the heading indicator is not moving you are in wings-level flight — and that is the way you want to descend.

Now, how do you use the mag compass as a wings-level indicator? All you have to do is to attempt to maintain a constant heading. The secret to its use lies in this question: *What heading do you try to maintain?*

Here are the options:

★ *North* — definitely not. It's much too difficult, if not impossible, due to turn lag indications in the opposite direction. These are guaranteed to lead to confusion.

★ *East or west* — no again. On these headings, turns will indicate proper direction but much too slowly. Also, acceleration and deceleration forces will produce erroneous or exaggerated indications.

★ *South* — YES. This is the answer. The compass will indicate turns in the proper direction much more quickly than the actual rate of turn. (Note: In the southern hemisphere your mag compass behaves differently. Down under use north).

The beauty of this southerly-heading lead error is that it gives an instantaneous indication that you have departed from wings-level. All you have to do — theoretically — is stop the turn on the compass and you are back to the wings-level position. Speaking more realistically, in practice you will probably overcorrect and indicate a turn in the other direction. You'll alternate stopping turns — and you will soon see that you are wing-rocking through wings-level flight. Still, that's better than loss of control.

In the clear, before starting down, set yourself up an eyeball attitude and establish your descent with your vertical velocity, airspeed, and altimeter. Once back in the clear below the clouds, it's VFR all the way home.

Certainly you have to be smooth and not a ham-fist. Even then, maybe it won't work for you. But I suggest that before some of you knock it, *try it!* It might be all you have to work with some day. I did some experimenting, and I'm convinced: it really works!

"Free as a bird" may be one description of flying — but note that even the birds use what they have to to avoid the hard things. If they could, they might call it . . .

Cerebral Volation

by Maj R. L. Wing

NO MATTER WHERE YOU ARE as you read this — easy chair, crew bunk, or W. C. — mentally put yourself in the driver's seat of your airplane. If it's one of our many-motored biggies, you'll be surrounded by a maze of handles, knobs, dials, switches, lights, levers, crewmen, and other interesting things. If your fly-thing is a puddle-jumper, you may have nothing more than needle, ball, airspeed, throttle, and stick. In either case, all these niceties are merely extensions and augmenters of your basic senses, skills, and movements. No matter what you have available — grand array or rude simplicity — the manufacturer put it all together for one purpose: so you can fling your more-or-less eager craft through those unmeasured halls of space. However, no manufacturer can add the last element: the man (or woman) who makes it go.

Now, of all the things available in your own man-aircraft package, what item would you single out as the most important? What device will help you the most in preventing predicaments — in avoiding those things which can ruin your whole day? If you immediately answer "My head, dummy; my noggin; the old bean," you are at the head (no pun) of the line in getting the message.

Head use comes in a variety of categories. In "Flying Can Be Fun," Col Petrak talked of rules and purposes and checkrides. In "IFR on Pitot-Static Only," Maj Burkett got in some words on knowing your instruments and systems. Even C. R. got in the act by losing his head over a bird and a girl. Now I'd like to get in a few licks about using your head to avoid those things that can ruin your whole day — the hard things in flight.

One: Other Airplanes

According to the National Transportation Safety Board (NTSB), civil aviators logged 223 midair collisions over a ten-year period. MAC birds added a few to the total; one of our latest was a B-57-light plane accident in the southwest. Does head use enter the midair picture? Consider these:

★ Two ladies were flying a Cessna 182 from Monroe, Louisiana, to Dallas. They were maintaining legal VFR near some pretty impressive clouds, and were using a combination of single-station VOR and map-reading to keep close to course as they dodged the bigger buildups. While maneuvering south of course to avoid a thunderstorm, they wandered through what turned out to be the departure funnel for Shreveport. Two heavy-jet near-misses and several wild gyrations later, they began to rethink their flight. True, they were legally VFR — but the big jets had come thundering out of the clouds and nearly hit their little plane. As the reporter of this incident summed it up, "Slowly they absorbed the understanding that *legal minimums are no guarantee for safety in the absence of good judgment.*"

★ The NTSB, while examining a fatal midair between a DC-9 and a Piper PA-28, decided to review the entire collision problem. They concluded, after an extended hearing, that: "No one solution will eliminate the hazard potential." At the top of their list of things to improve was this: "Pilot education and awareness of the collision potential." A rough translation would be *more head use*, including understanding the key points from this article.

★ "Midairs are things that happen to other people." Right? Like many

or How to Avoid the Hard Things in Flight

others, I held that opinion — until, during a flight over Germany, three of us in a T-39 actually *heard* two F-104s go by our aircraft. We each had been cleared to operate in uncontrolled airspace above FL 250; though we were on an IFR flight plan and the fighters were on VFR on top, both of us were receiving radar advisories (and, oddly enough, were working with the same ATC facility on the same frequency). Five pilots, five miles up, with limited head use. Good luck saved us — and that's a mighty poor element in safe flying.

Two: The Surface of the Earth

Mountains, snowbanks, hangars, trees — if you can find it on the surface of the earth, an aircraft has probably hit it. Small planes bash the widest variety and biggest number of things, but a glance at the many mishaps reported in these pages over the years will tell you that MAC suffers its share. And the reasons for these crashes are almost as varied as the things being hit. Here are some "surface strikes," all with good evidence of bad headwork.

★ A Martin 404 crashed in the eastern Rockies during a sightseeing junket, killing 29. The aircraft was airworthy; the chief driver apparently was not. Said the NTSB: "The probable cause was the intentional operation of the aircraft over a mountain valley route at an altitude from which the aircraft could neither climb over the obstructing terrain ahead nor execute a successful course reversal." There were a few other things, described as "numerous deficiencies, unsafe practices, and deviations from regulations." In fact, *no one* took responsibility for the safe conduct of this flight.

★ A Short Skyvan, a stubby, light freighter, went out of control and crashed when the pilot tried to salvage an approach. The weather at the time was not too great, and current rules required the pilot to maintain 700 feet until he saw the field. Apparently the crew first saw the runway when they were pretty close; the investigators computed that their sighting position would have required a 13-degree glide slope (4 times greater than normal but possible in a Skyvan) and a 2,100 fpm rate of descent. As the aircraft entered this sudden and steep descent, the poorly secured ton-and-a half of cargo slid forward, shifting the center of gravity so much that the elevators were no longer effective. Scratch one Skyvan and two drivers. Though FAA regs required effective cargo tie down, this entire load was restrained by only one strap attached at either end to seat fittings. Note: depending on the size of your aircraft, a wandering pallet or a couple of out-of-control suitcases could put you in a bind, too. The bind will be worse if you're over-grossed to begin, as this mini-freighter was. Think about it.

★ Petrol deprivation is a guaranteed method of abruptly ending flight away from a prepared surface. The crew of a Twin Otter learned this too late, during a series of instrument approaches in an environment of deteriorating weather, diminishing endurance, and defective thinking. The problem began when the pilot declined servicing at his last departure point, then began missing uneducated guesses of how good the weather would be at several possible landing sites. A chain of "we can stretch it" decisions during the last hour of flight produced a destroyed aircraft and five fatalities. Quoth the NTSB on probable cause: "Fuel exhaustion resulting from *inadequate flight preparation and erroneous in-flight decisions* by the pilot in command."

Does the message begin to get through?

Three: Air

The third hard thing in flight is the air itself. "Oh, come, now," we can hear you say. "Air is the very stuff of flight. *Hard* air?" Right. Specifically, air made very hard by turbulence, be it from jet streams, mountain waves, thunderstorms, or the wakes of other aircraft. Some cases:

★ A C-124 flew into a funnel cloud aloft, spreading wreckage over eight square miles. Over-active air and an under-active radar set the stage.

★ An aero club Cherokee 180 and the four souls on board were lost at sea "in the vicinity of a thunderstorm." We've all been briefed on the tricky winds, hail, heavy rain, dust, waterspouts, and other violent things near thunderstorms. So had this pilot — but was he listening?

★ Violence on a smaller scale can come from wake turbulence — and from heavy helicopter rotor wash. The pilot of a Cessna 0-1 was cleared to taxi to, but hold short of an intersection where a chopper crew was practicing autorotations. The Bird-dog stickman knew of the hazards — light planes and choppers were frequent flight mates in his SEA area. But he taxied too close, and the rotor wash of the chopper on a go-around almost wiped out both bird and birdman. This can be a ZI problem, too. And, as commuter line helicopters come into more common use, the rotor-wash risks faced by pilots of lighter aircraft will increase.

A Letter

This whole idea of using your head while using your aircraft was summed up very well in a letter from one of our pilots in the war zone.

* * *

Dear Dad,
You asked about the dangers of flying and the number of mishaps that occur over here that result in fatal injuries. Relatively few of our craft are destroyed by enemy action. I would say that complacency or a false sense of adequacy causes more crashes than any other factor. Aviators attempt unauthorized maneuvers, run out of fuel, become disoriented or lost, fly low-level and crash into obstacles, or attempt take-offs or landings that are not within the capability of their aircraft. The craft that we fly are relatively safe and in most cases prior planning and professional competence normally result in a safe landing if a mechanical malfunction occurs. The loss of aircraft to the enemy is accepted risk and is the nature of war, but at times it is difficult to understand, why, with the inherent risks of combat always present, our aviators make such stupid mistakes (that is the only way to describe them, stupid*). I imagine that as long as man experiences the exhilaration and freedom of flight, and the need to foolishly exhibit his manhood and mastery of his machine, accidents will continue. A competent aviator must realize both his own and his aircraft's capabilities and limitations, especially in a combat situation. A loss of an aircraft, whether by enemy action or by accident, is still a loss to our cause.*
To better answer your question, no, our machines are adequate. It is the human who is dangerous.

* * *

His comments are as true today as they were when he wrote them 54 years ago, in the spring of 1918. Looks like you and I have as much room to make with the good head-work as did our dads and granddads in *their* wars.

One sage put it like this: When all else fails, think. Exercise your head and avoid the hard things. Even the birds use a bit of brain — and cerebral volation is just another name for smart flying.

Return with us now to those thrilling
days of yesteryear, as we reveal the . . .

Birth

hright of a Breed

by Capt Dennis W. Stiles, 67 ARRSq

IT WAS IN THE EARLY DAYS OF CELTIC ENGLAND, before the lusty Arthurian legends were even dreams, that an angry murmur raced across the small western kingdom of Cramalittle. Broad curses rattled the walls of many a castle. Blushing maidens swore modestly into their pillows. Common swillers spat in their beer, and even Sir Sweetself, the court favorite, was reported to have sneered at a picture of the king.

Now the source of this pervasive agitation was a simple proclamation tacked to a tree which shaded the royal box seat at the jousting ground:

> *Be ye by this notice informed that the threats, jibes, jeers, and generally greasy disposition of the devious residents of our neighboring kingdom Pillagepot force me to strengthen our defenses. Through the genius of my honorable and generous treasurer, Sir Scrimp, I have found a way to gain this end without spending a groat. I have this day dispatched a loyal scout to search for and bring back one Gloomjaw, a wandering wizard much acquainted with the problems of*

Birthright . . .

SAFE ACTIONS, who has been reported in this neighborhood. Prepare yourselves, then, for the consequences of his wisdom.

King Flit

Now, no one in the kingdom of Cramalittle had actually seen this Gloomjaw, but rumors of his sinister ways had traveled widely across the land. His heart, the peasants said, was molded from the frozen excreta of the long extinct Ironbird and put in his breast three years after he was born. His pen was believed to have been handed down through generations by a family of witches who blessed it each All Saints' Eve by dipping the wicked point into a mixture of toad brains and bat bile.

* * *

A week later, Gloomjaw arrived in Cramalittle, and the appearance of this strange man confirmed his reputation. He had a nasty, doubting mouth and a great protruding nose that would lead him, in the days that followed, into every wrong place. His worst feature was a glinting black eye that peered like a hot coal from under his drooped, unblinking left eyelid. A glance from that raven orb would fix the strongest knight in his very tracks and cause the warmest blood to run cold.

Without a word to man, woman, child, or beast, Gloomjaw set to work. For three days he skulked and slithered around the camps and stables of the nervous kingdom. Women saw a shadowy shape glide ominously across their windows and quickly broke a hare's bone and buried it next to a carrot in the garden. Babies whimpered in the darkness of early morning. Brave knights in the heat of strenuous combat training shivered at the stab of his stony stare. Oaths were whispered down wells and written with sticks in the dust. It was an uneasy time.

On the morning of the fourth day, this strange visitor appeared before the king. "Your Majesty," he intoned respectfully, with a bow rather lower than necessary, "I have to report that I have seen sorry things in my little time here." He shook his head mournfully. "Bumps, knocks, rips, bruises, dents, crimps, gouged eyeballs, bashed brains, saddlesores — and all unnecessary. *Totally unnecessary!*" His fierce eye flicked wildly around the hall. "Not a knight in the realm walks without a limp or a gimp. I see as many blind eyes as quick. A man's worth and charm with the ladies is measured in scar tissue. Your army, in short, is devouring itself. Give me free rein, Sire. Give me free rein that you may be saved!"

King Flit listened carefully to over half of what the wizard said, then whispered shrewdly into the ear of his trusted treasurer. Sir Scrimp, his hands clutched in his best groat-gripping manner, approached the foreign fellow with artful humility. "Your most noble sir," he began, gasping as if the very words he spoke cost him dearly, "we are deeply grateful for your efforts. However, I am forced to advise you" — and here he sighed heavily — "that our money bins are moldy, our crops thin, our very virgins withered. We can pay you nothing. But we can offer you the gratitude of the kingdom — and perhaps even an honorary knighthood." He raised an eyebrow hopefully.

Now the king knew full well that the wanderer, because of an ancient curse on his line, must toil without compensation; Gloomjaw labored only for the sparse rewards of hope. King Flit suspected, however, that such a humble offer of honor, made as a kind of ceremony, would inspire the man to greater efforts.

In response to the treasurer's plea, Gloomjaw again bowed so low that his chin nearly touched his knees. "If it please Your Majesty, I work for one end alone, and that is to gain the eternal respect of a kingdom. Until the day when that reward is granted me, I am condemned to wander the earth in this hideous guise, thrusting myself into the affairs of reckless youth and raucous men, unloved and" — a tear toured the twisting channel from his eye-slit to his ponderous nose — "unpaid. Please accept my humble services — perchance your kingdom will be the one."

"Done," said the king.

* * *

The next day the king announced Gloomjaw's new power, and soon a great flurry of activity began. Boards of clean pine were tacked to trees and buildings, and on them were posted quaint sayings and carefully drawn sketches of each dent in a helmet and each chipped tooth. (Great debates raged over the color of these boards: lavender, pink, or slanderous red, each valiant wanting a tribute to the wishes or character of his lady.)

By day, knights muttered strange chants under their breath:

LANCE FAILURE

1. **Discard broken lance**
2. **Place right hand on hilt of sword (if right-handed)**
3. **Move arm in upward and outward motion**
4. **Direct point of sword away from body**
5. **Use as required**

By night, hideous oaths were breathed into the musty, secret air of tower chambers, causing candle flames to

tremble and dogs to whine. "May his eyes rot in his living head." "May his tongue turn to curdled pudding and drown the life out of his lungs." "May his wife have sour breath and running sores." "May his children wet their beds and dance on his coffin." Old Lady Scratchpit was said to have sprinkled the ashes of a cremated grandfather rat in Gloomjaw's soup. He was not, all in all, a popular fellow.

* * *

The great event of his stay came on his seventh day of service. In the midst of a routine jousting practice on the royal grounds there was a great crash of metal that faded into scattered clanks and tinkles and finally into silence. All eyes fixed on the middle of the field, where the gallant Sir Strappinghulk lay mutilated and groaning under his quivering horse, and where the mighty Sir Brawnbeam had collapsed into a senseless, gaping heap by his side. It had been a collision of magnificent proportions, involving the greatest figures of Cramalittle's knighthood.

Gloomjaw's eyes flashed dangerously as he pushed through the crowd to the scene. "Clear the spot! Clear the spot!" he shouted. "Tag each boot and bit. Move not one rowel! Stir not one clod! Footmen, gather ye witnesses under yon tree. Scribes, record their sayings and change not a word. The truth will out before the sun's been swallowed by this night."

Then the wizard set to work. He whispered rapid questions to each victim as they revived and were dragged by the heels from the field. He took each horse's pulse. He measured, weighed, and mused. He grilled the bystanders singly and in pairs. By five o'clock he had a verdict.

The king assembled the royal court and the crowd trembled in anxiety. The fallen knights, swaddled in surgeon's wrappings, were brought in on stretchers. Then Gloomjaw, in a deep, somber voice that had the hollow ring of caves and tombs, began to read.

"I, Gloomjaw, wandering wizard in good standing, having thoroughly investigated the circumstances, clues, and signs of the zodiac surrounding this unfortunate and unnecessary" — he looked up here and burned the crowd with a stare — "*totally* unnecessary accident, do reach and render the following conclusions:

> "1. Yon Strappinghulk did fail to carry his jousting checklist and thereby wanted Item 9 (Visor Position, Turns) and did have his visor only in the half-raised manner, hiding the best beam of his eye from yon Brawnbeam.
>
> "2. Yon Strappinghulk did fail to note and record the time of his horse Stumble on the mandatory warm-up laps and thereby did lack that fine and final knowledge of said horse's want of hurry."
>
> He paused to turn his scroll ahead, then gazed sharply at the moaning Brawnbeam and continued.
>
> "3. Yon Brawnbeam did willingly and in great measure exceed the limit of the trotting speed, practice joust, as is clearly lettered in the fourth line from the top of the second rule from the right on the board that is tacked outside Sister Scratchpit's cottage.
>
> "4. And" — here he sucked in his breath in hissing disbelief — "yon Brawnbeam did negligently and unforgivingly fail to tie his saddlebelt! This grievous error permitted him to pitch forward into yon Strappinghulk at the fateful moment. Strappinghulk, by good chance, had his saddlebelt tight fast and was able to keep a good seat as his horse fell on him.

"Therefore, I pronounce you, Strappinghulk, and you, Brawnbeam, guilty of knight-error." The crowd hushed. Gloomjaw made a grand, dramatic pause, and suddenly thundered, "These violent and mournful events shall leave their mark!" He hesitated and lowered his voice, almost as if in awe of what he was about to do. "In payment, men shall learn. May your majesty sentence you both . . . May he sentence you," he began again, "to ride side-saddle for the rest of your dreary days on this earth. And may you both serve as an example to light the way for other men with your blindness." Then he strode away.

* * *

That night, as had happened in many places before, Gloomjaw disappeared. He was never seen in Cramalittle again. Rude rumors and suspicions were circulated, but no charges were laid at the feet of any knight. Instead, the kingdom celebrated with a grand, wild tournament. Wine and blood both flowed freely, and the shambles of armor and steeds was truly a sight to behold. The carnage was such that the forces of the kingdom were decimated; forsooth, that very week the Pillagepot army overran Cramalittle's defenses and carried away their laughing and singing virgins for libidinous purposes.

No one knows if Gloomjaw ever broke his curse, but some suspect that his heirs, or indeed the man himself in cautious disguise, still wander among us.

Psychogenic flicker,
sensory disorientation,
flick psychosis or . . .

FLICKER VERTI

MANY ARTICLES have been written about flicker vertigo (FV) and it has been described in many ways. Before attempting to define FV, it should be noted that it applies to many environments; i.e., aviation, TV, auto, train, etc. Our primary interest is aviation safety, so we will concentrate on FV as it relates to aviators, specifically rotary wing aviators.

Flicker is defined as an unsteady waver, flutter, movement in a quick glancing manner, fitful burning or fluctuating light. *Vertigo* is defined as a disordered state in which an individual or his environs appear to whirl dizzily, or a dizzy confused state of mind. One medical dictionary cites vertigo as dizziness, especially the feeling that the surroundings are whirling.

Another authority states: "Vertigo and pilot vertigo are, in flying parlance, essentially synonymous with spatial disorientation. Although medical use of the word vertigo usually connotes sensations of actual spinning, most pilots take it to mean confusion about spatial orientation, whether experiencing a spinning sensation or not . . . ."

Still another source states: "The word itself is hard to define. To earthbound individuals, it usually means dizziness. To a pilot, it means, in simple terms, that he doesn't know which end is up." Pilots use the term vertigo in referring to many types of confusions with respect to attitude and motion during flight. Vertigo has come to denote almost any type of experience in flight which does not correspond to actual events.

The reason for this belabored explanation of the term vertigo is that flicker vertigo may be a misnomer. Vertigo, in pilot talk, usually refers to a confusion about spatial orientation. Flicker vertigo should have a more definitive name, such as photic stimulation, photic activation, photic hypnosis, psychogenic flicker, sensory disorientation, or flick psychosis.

What causes FV? The environment is the key. An environment which produces flickering light at frequencies from 4 to 30 flashes per second (FPS) can cause FV.

What effect does FV have on aviators? It can produce unpleasant and dangerous reactions in some people. These reactions may include nausea, dizziness, grogginess, drowsiness, unconsciousness, daze, disorientation, headaches, confusion or even reactions similar to epileptic seizures. The reaction of most concern to aviators would be one producing convulsions. FV has also been described in terms of uneasiness, nervousness, hypnosis, gastrointestinal discomfort, and a feeling of severe panic.

by David T. Forbes Jr.
USABAAR

Reprinted from U. S. Army Aviation Digest

You need not be a qualified aviator to understand that panic is a most undesirable state for a pilot at the controls of an aircraft.

Here are some case histories which may better explain the effects of FV on aviators:

Case 1

The pilot woke up at 0200 after 2 hours of restless, noise-disturbed sleep aboard his aircraft. As he awoke, he saw that the copilot's head was thrown back and making a jerky side-to-side movement. A crewman, summoned to the cockpit, restrained the copilot who went into convulsive leg and arm movements, striking the pedals and cyclic control. The fact that his shoulder harness and lap belt were secured prevented completely uncontrollable activity during his seizure. Nevertheless, the pilot had considerable difficulty maintaining control.

The copilot lost consciousness for the next 10 minutes, during which his convulsive activity waxed and waned. At one point, the crewman tried to check the copilot's tongue to make sure he could breathe, but could not open his mouth because his jaw muscles were contracted. After landing, the copilot again reached for the controls and had to be restrained. With the aid of a crash crew, he was forcibly removed from the cockpit through the emergency exit and taken to the dispensary.

On arrival at the dispensary, the copilot was dazed, groggy, and disoriented. A neurological evaluation was made and his electroencephalogram (EEG: brain wave pattern) was normal, until light stimulation at 10 to 12 FPS was attempted. At this time, seizure activity was noted and the procedure stopped.

Case 2

While on a southbound morning flight along the coast, a crewman who was sitting in the copilot's seat of an SH-34J, convulsed with generalized movements of his arms and legs. During his muscle spasms, he pushed uncontrollably on all flight controls. The pilot had extreme difficulty controlling the helicopter and at times came within 4 feet of the water. The flight surgeon reported the crewman was totally disoriented, uncoordinated, sweating profusely, and complaining of severe headache. His confusion lasted approximately 1 hour. The crewman had only 3 hours sleep the night before because of a change of shift and his early arousal for the flight.

Case 3

After a helicopter had been airborne for about 10 minutes, the pilot began to feel sleepy, suddenly lost consciousness, and had a convulsion. He later reported, "All I could see was a bright flicker of the sun through the rotor blades."

Case 4

A B-36 tail gunner, while scanning the engines, last remembered seeing the sun through the slowly turning propeller blades. He had a grand mal convulsion. This man had never had a previous seizure.

Case 5

While standing on the ramp waiting for an incoming C-54 to shut down, a pilot, serving as airdrome officer, noted the rays of the setting sun through the revolving propellers and had a grand mal convulsion on the ramp.

Case 6

A pilot reported: "In solid stratus with light to moderate rain, I decided I'd take time to turn on the wind-

FLICKER . . .

shield wipers just before intercepting the outbound radial. If you've never used them in the SH-3A, I can tell you they actually bump the front end of the aircraft. While I never noticed them to be particularly distracting in VFR weather and had never used them in IFR weather, I was suddenly aware that I could hear them bumping and feel them in the seat of my pants. My scan was peripherally catching the bottom inch or so of the blades. I paid little attention to them until I rolled out inbound and started my descent. Then I was struck with the worst case of vertigo I've ever had. I found myself forcing the VGI to stay level, and every time the wipers thumped, I'd swear I was kicked another 10 degrees off course to starboard. It got progressively worse to the point where my rate of descent became erratic due to my fixation on the VGI. Things felt mighty hairy between 1,200 and 800 feet."

Case 7

A recent case of flicker vertigo was caused by sun reflection from a vibrating masonite hood installed in an aircraft for instrument practice. The pilot reported there was no appreciable time element involved. As soon as the aircraft was headed in a direction where light produced a flicker, it caused an immediate attack of vertigo. As soon as the pilot recognized this condition as vertigo, he concentrated on the instruments and was able to read them, although they appeared to be floating in the air. He found that he could stop and start the vertigo by holding the hood piece tight against the aircraft structure to stop the vibration.

Case 8

After flying for some time at an altitude of 16,400 feet, a pilot in a single-seater propeller aircraft made a perfect landing. However, he did not taxi the plane to the hangar. Instead, the plane remained motionless, its propeller revolving slowly. The pilot was found bent over the controls, unconscious. At first, it appeared he had not used his oxygen mask. However, in this case, the pilot had lapsed into unconsciousness only after making a good landing. The rays of the low-lying sun were shining on the slowly turning propeller blades. Reflected flashes of light were being thrown on the pilot's face at a rhythmic rate of about 12 flashes per second.

Case 9

"Flying a Culver Cadet, I was approaching to land at a small field. My approach was directly into the setting sun. During the latter part of the approach, I very nearly passed out and felt a general wave of nausea. I was able to land, but while taxiing further down the runway, I still felt an impending sickness. It only stopped when I turned away from my westerly heading."

* * *

It has been noted that the Germans used a variation of flicker vertigo during World War II when their searchlights were deliberately arranged to flicker in order to irritate attacking pilots. The worst frequency for this searchlight flicker was found to be between 4 and 12 cycles per second.

Do certain frequencies produce different reactions? Yes; one source reports a critical frequency range of 9 to 15 FPS for producing subjective sensations. Another indicates that the phenomena of flashing lights having physiological effects are not limited to the FV concept. The frequency of 6 to 8 FPS has been reported as producing an out-of-phase response of the iris and optic nerve, resulting in loss of depth perception. This source also reports that 25 FPS interferes with alpha waves in the brain. This affects the ability to concentrate.

An article on eyes cautions pilots about using polarized sunglasses in aircraft with electrically heated windshields. It seems there is a possibility of FV resulting from light waves generated by the electrically heated windshield and filtering through polarized sunglasses at the correct frequency for photic stimulation.

Is the probability of FV exposure greater in rotary wing aircraft? Yes, although fixed wing aviators may be exposed to FV. The probability of their exposure in contrast to helicopter pilots is less. The fixed wing pilot is exposed only in limited situations (i.e., windshield wipers, slowly turning propeller, anticollision light in restricted visibility, etc.). Rotor blades passing over the cockpit subject rotary wing pilots to a constant situation of light being flicked by the passing blades. Flight into or away from a rising or setting sun may exaggerate this condition. Comparing the 4 to 30 FPS FV frequency range to the helicopter environment, we find that most helicopters are FV inducers.

Are there any helicopters which are not FV inducers? Perhaps the OH-6 and Soviet Mil V-12 are exceptions because the pilots are out from under the rotating blades or outside the frequency range. However, this does not mean that FV exposure can't happen in these two helicopters, because there are many FV inducers. Here is a partial list of potential inducers:

1. Rotor blade passing over cockpit
2. Slowly revolving propeller
3. A functioning anticollision light
4. Position lights on flash
5. Perceiving strobe light
6. Operating windshield wiper blades
7. A vibrating instrument hood
8. Doctored searchlight
9. Polarized sunglasses and electrically heated windshield
10. Others — (Nonaviation)
    Laboratory photic stimulation
    Fence posts flashing by
    Television

Now that we have described and discussed flicker vertigo and its results, the question is, what can we do about it?

Can we redesign the environment? No, it's impractical to redesign helicopters where cockpits are remote from rotor blades or to reengineer rotor aerodynamics outside critical frequencies.

Can we adapt pilots? One authority says, "Adaption does not appear to be a significant factor. Many of our pilots, especially those with little helicopter experience, reported they had no experience with flicker, thus no opportunity to adapt. Research and clinical findings indicate that, while the abnormal EEG response to flicker may not appear on each examination, adaptation does not occur."

Can we screen our pilots through photic stimulation and EEG examination? It has been established that persons with epilepsy are susceptible to flicker vertigo. Photic stimulation can activate this condition and an EEG can record it. It has been recommended that all pilot trainees be examined for sensitivity to flickering light though it might not be desirable to use available EEG criteria for negative selection of aviators without supporting clinical evidence. However, it has been stated that the current status of such methods warrants a strong recommendation for recording EEGs on all aviation candidates. One authority stated: "Though photic stimulation does not appear to be useful as a screening technique for latent seizure disorders, it does appear to have value in identifying those who find flicker irritating, annoying, or confusing. It also identifies a group of pilots in whom flicker produces a lowered state of vigilance. These findings suggest that if photic stimulation is going to be used to screen pilots who may show EEG abnormalities or sensitivity during flicker, this screening should be done earlier, perhaps before any flight training in helicopters."

Can we condition the pilot? Education appears to be the solution — education about the FV phenomena and conditions leading to it. Fatigue is directly correlated to FV. Fatigue and frustration tend to increase the annoying quality of flicker, and FV manifestations appear to be even more pronounced. We can educate our pilots and supervisors about the dangers of fatigue and frustration.

Low g tolerance seems to suggest a greater susceptibility to FV, as well as to hypoxia, hyperventilation, and hypoglycemia. We can warn our pilots about the insidious sleep-inducing and hypnotic effects of FV. Performance appears not to be affected by photic stimulation when a pilot's attention is deliberately focused on his task.

Can pilots physically offset FV? One suggestion is to shield the eyes (though research suggests that merely closing the eyes does not reduce photic stimulation). Shielding the eyes and other protection measures could take the form of:

1. Turning the helicopter to a point where sunlight does not flicker through the blades
2. Turning off anticollision lights
3. Switching position lights to Steady
4. Going to 100 percent oxygen to prevent or reduce hypoxia
5. Eating appropriately to prevent hypoglycemia
6. Removing a vibrating instrument hood
7. Removing polarized sunglasses
8. Changing and varying rpm to break the photic stimulation pattern.

C.R. TERROR

With a touch of spring fever and a lust for the finer things of life — wine, women, and aviation — the Bald Baron strikes again.

AWAKENED BY GLEAMING SUNLIGHT, the Rotund One rolled over in his new oval water bed. Seconds later, as his brain came up to speed, C. R. Terror, the World's Greatest Aviator, sat bolt upright in bed and snatched his massive Glycine Airman off the antiqued ivory nightstand. "Oh my gosh," he blurted as he saw the time, "I'm supposed to pick up Becky in 20 minutes." For the first time in 23 days, the proverbial prevaricator of meteorological phenomena had forecast sunlight. The Aerial Ace, never missing a chance, reserved the aero club's Cessna 150 and had made a flying date with Becky. He had had a falling out with her over some women's lib bit, but now with spring fever running rampant, he had a chance to get back in her good graces. He hummed to himself as he thought, she won't be able to resist me as I wing her through the sky displaying my masterful aerial skills.

* * *

The Lothario of the Airlift Lanes, temporarily turned Road Runt, sped cross-town in his powder blue 427 Corvette, top down, and mustache flapping in the breeze. A screeching of tires announced his arrival as he churned to a halt in front of Becky's house. Feeling the touch of spring, he nimbly leaped over the door — and smartly flattened his nose as he caught his shoe on the top of the door, and went crashing onto the sidewalk. "Son-of-a-sea-cook, that smarts," he muttered as he picked himself up. He was rubbing his nose as Becky opened the door and invited him in.

The Pudgy Pilot's eyes bulged from beneath his balding brow as Becky turned to pick up her custom-made leather flying jacket. Dressed in black leather hot pants, with boots and a see-through blouse, she was a vision of earthy delight. The Balding Baron of Bordellos caught a whiff of the delicate trace of Shalimar she wore and, picturing the close quarters of the airplane cockpit they would soon occupy, his mind boggled. He was shaken back to reality when she asked him, "Are you going to stand there all day ogling or are you going to help me on with my jacket?"

The short drive to the aero club was spent exchanging compliments

— Becky about C. R.'s car and he about her new hairdo.

C. R. checked with the operations desk to get the keys. "I'm sorry Major Terror," the manager informed him, "but you can't take any passengers with you. It's against the regs."

"What da ya mean no pax? I've hauled passengers since before you were born. Give me the club president's phone number and I'll get this straightened out right now," C. R. boasted. The phone call straightened things out — C. R. that is. "Well, I'll just have to implement plan B."

"What's that?" queried Becky.

"We'll just have to go back to my place and spend a leisurely day . . ."

"Oh no, we won't. You said you were going to take me flying," she cut him short.

"Why don't you call Jake's Flying Rentals over at Clifton? He's got some 150s," offered the manager.

"Hey, that's a good idea. Do you have his phone number?" inquired the Round-bottom Romancer. C. R. called and discovered that all of Jake's Cessna 150s and 172s were busy. However, there was a Cessna 195 available which C. R. quickly reserved. As he hung up, the Ace of all Aerospace muttered to himself, "195 — hmmm. I never even heard of one of those before. Oh well, I've flown the 150, the 172, and the 182. This must be a newer model yet. Humph, if you've flown one Cessna you can fly them all!"

Ten minutes later, C. R. and Becky met Jake and saw the Cessna 195. It was not what C. R. had expected. The Cessna 195 turned out to be a big, strutless, high-wing, monoplane with a radial engine and a tail wheel. The Ace Aviator was momentarily taken aback, but he quickly recovered and then set about selling the local operator on his unquestionable qualifications as a pilot and especially his talents at piloting a 195. The Articulate Aeronaut sprinted nimbly around the outside of the Cessna, noting that it seemed to be complete: two wings, one engine, and a tail. He hopped in, then quickly nestled Becky in the right seat and, after a few moments spent fumbling for switches, began cranking the engine.

C. R. quickly taxied the tail dragger to the end of the runway, doing several 360 degree turns on the way out. He glibly explained to Becky that he was clearing for traffic — actually, he ground looped it three times. With the approach clear, the Master Manipulator rolled onto the runway, stopped, and set the brakes.

"Becky my dear, you are now about to see the wonders of man. I'll put this fine old winged wonder through its paces, dazzling you with aerial skills which only the Thunderbirds could equal." He puffed his chest and continued, "I often wonder why I waste my time flying the heavies when my talents could be put to use as team leader of the T-birds. My first test of this trusty bird will be a modified and daring version of a carrier takeoff."

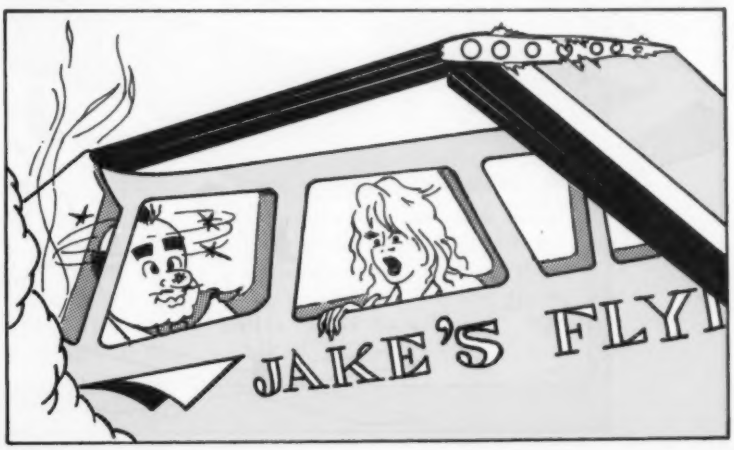
"What's a carrier takeoff, C. R.?" purred the slinky-looking gal nestled next to him.

"My little chickadee, sit back and relax, whilst I demonstrate." C. R. rammed the throttle to the hilt, then grabbed the yoke, and pulled it to his lap as the 195 almost nosed over. As he pulled the yoke back, he quickly and unevenly released the brakes, and they gyrated down the runway. He snatched the airplane off the ground at minimum airspeed and distance — a necessity as they were rapidly nearing the left edge of the runway. The effect was indeed quite remarkable, especially for Becky. Her squealing wasn't from delight, but because the back of her seat broke loose, flinging her backwards and into a reclining position. Her wig came off and floated in midair like a bird's nest.

The Aerial Ace was too busy to help his passenger as he now recognized that he was in a 90-degree bank, 50 feet in the air, and crossing the end of the runway. C. R. swiftly took corrective action.

"Good grief, C. R., do something!" Becky shrieked as she finally got her seat upright and saw the city dump straight ahead.

"Baby, I'm trying! But I'm short on airspeed and altitude!" C. R. fumbled around the cockpit looking for something to tell him what was wrong. Becky had flown enough to know that the throttle should be in instead of out. "The airspeed will never increase without some gas, you dummy," she offered. As C. R. stiff-armed the throttle, she continued, "Now tighten the friction."



Mr. Thunderbird was all hands and feet as the sudden surge in power had him in another unusual attitude. The 195 was now floundering through the air near the hangars, approaching a row of trees.

"Yowee, look out!" the panicked cry from Becky alerted C. R. to danger. He glanced up from trying to find the airspeed indicator and throttle friction just in time to yank back on the yoke and climb over a row of hemlocks. He recovered with a "Heh, heh, this reminds me of the good ole days when I flew all low level — surprise attack, you know."

"Major C. R. Terror, I'll give you a surprise attack if you don't get this airplane back on the ground this very minute!" Becky fumed.

The Aviator with Avoirdupois could see that his lady friend was not kidding. His daring maneuvers had not enthralled her — she was unimpressed, to say the least. In a last ditch effort to recover, the Spheroidal Stickshaker leaned over to console her and calm her shattered nerves — anything to save a beautiful day.

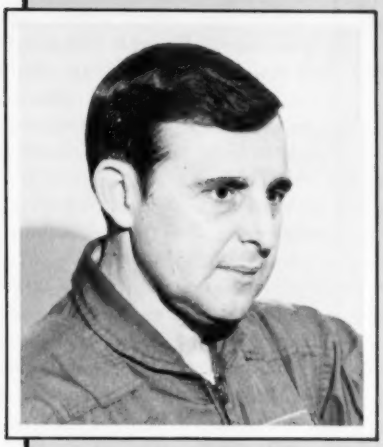
"You bumbling idiot, get your hands off me and fly the airplane! You're going to kill us both. Look out! We're going to . . ."

Her words were unheard in a resounding crashing and mashing of wood and metal — and then there was silence.

A bit shaken but none the worse for such a horrifying experience, Becky calmly crawled from the wreckage — C. R. right behind her. Suddenly she turned and began beating him with her purse. "You . . . you . . . no good . . ." and she sputtered for words.

C. R., his steel-like composure never once melting, commented, "You said you wanted to get back on the ground this very minute." And then he took off running as she picked up a large stick.

Combat Airlift Competition 1972



GOOD SHOW

MILITARY AIRLIFT COMMAND

The engine immelmanned over the wing, flew 250 yards — and crashed.

MAJOR RICHARD E. LEAL, 56th MASq, Altus AFB, landed his C-5, dropped off a pilot, and taxied back for another takeoff. So far it had been a normal training mission. The aircraft was cleared for takeoff, and Major Leal taxied into position and set takeoff power.

Just prior to brake release, the entire crew heard a loud thump and Major Leal retarded the throttles to idle. The only cockpit indications were red flags on the number one engine instruments. At the same time the tower operator informed all pilots in the pattern that an aircraft was on fire on the runway and alerted the fire department.

Major Leal directed the student pilot to scan the left wing, and ordered the crew entrance door to be opened. The student pilot confirmed that there was a fire outboard of the number one engine. Major Leal pulled the fire T-handle and discharged the fire bottle. (This action probably saved the aircraft.) He then advised everyone to shut down their equipment.

After opening the crew entrance door, the scanner reported that a fire was still burning under the left wing and that part of the leading edge of the wing was missing. Major Leal ordered everyone to evacuate the aircraft. He pulled the remaining three T-handles and followed his crew through the crew entrance door, only 90 seconds after the loud thump. It was not until the crew had departed the aircraft and the fire department had extinguished the fire that they realized that the number one engine was missing. The engine had pulled from its mounts and flown up and over the wing, landing some 250 yards behind the aircraft.

COMAC cited the crew by saying, "It is evident that the quick action and professionalism displayed by those involved was instrumental in saving the aircraft." THE MAC FLYER adds a "Good Show."

Keep Your Cool

Remember General Catton's advice on emergency procedures? He said, "Cool, deliberate evaluation of a situation, when things seem to be really coming unglued, is not easy. But it is essential. Your life and the lives of others may depend on it. No matter what your aircrew position, you must Stop and Think."

We recently learned of a Navy jock who demonstrated the General's philosophy. Here is a summary of the occurrence.

"The Navy pilot casually asked center to cancel his IFR clearance. The center refused because the aircraft was in positive control airspace. To this the Navy pilot politely and calmly replied, 'My one and only engine has blown up, my aft section is on fire, and I intend to bail out. I repeat, please cancel my clearance.'"

Cool.

Tangled Trim Save

The value of an extra set of eyes proved itself again. The C-141 crew taxied their aircraft to the runway. During the flight control check the pilot set the pitch trim to 2.6 degrees, the takeoff setting. Cleared for takeoff, the Starlifter rolled down the runway. At about 50 knots a third pilot in the jump seat suddenly called reject. The pitch trim was passing 4 degrees nose up, and by the time the crew turned off the runway it had passed 12 degrees up! Investigators tabbed a malfunctioning elevator and electrical pitch trim switch as the cause.

Jump seat is a working crew position — and the man in the jump seat can be a real lifesaver.

Penetrator Pick-up Problem

A chopper topic of recent concern was static electricity and the forest penetrator, discovered during a shocking test of a new hoist on the UH-1N. The pickee approached the grounded penetrator while the pickor hovered overhead. The pickee strapped himself to the penetrator and gave a thumbs up. As the pickor rose the penetrator left the ground, but the pickee's feet remained in contact with mother earth. The pickee probably wished the pickor would have picked a little quicker because he suddenly began receiving intense and continuous electrical shock through the penetrator! The pickor quickly lowered the penetrator back to the ground and the shock stopped.

The aircraft was inspected for stray electrical leaks but none were found. The excessive static charges probably were caused by weather conditions and the necessity to maintain a 5-to-10 foot hover in this particular test. A recommended solution to the problem was to hang a 20-foot chain from the pickor so the aircraft would remain electrically grounded until the pickee's feet were airborne. Wow!

False Fire Warning--Again

During a local training mission in a C-141, the fire warning horn suddenly started to blow and the crew saw a blinking overheat light in the number two engine fire emergency control handle. The crew shut the engine down, but the light changed to a steady fire indication and the horn continued to blow! The pilot discharged the fire bottle and the warning horn stopped, but the light stayed on. On touchdown, the warning horn blew again and the alternate fire bottle was discharged. The fire warning light remained on until the aircraft was in the chocks and all the engines were shut down. There were no other indications of a fire.

The overheat and fire warnings were false and had been caused by a kinked fire detection loop on the number two engine. It had apparently been bent during some earlier maintenance activity.

We've said it before but it bears repeating. When the cowling is opened on a C-141, the fire detection loops are exposed and they are *very* easily bent. Make sure they're handled with care on your bird.

Sliding Starlifter

A C-141 pilot had completed a practice no-flap landing on a wet runway. He was attempting to turn the big bird onto the taxiway at the end when suddenly the nose gear tires started skidding. Despite efforts by both pilots to correct the situation, the nose gear managed to wipe out two runway threshold lights and do grievous injury to its own tires.

Since one of the pilots — who was a flight examiner — estimated the aircraft's speed at only 15 knots when the skid started, a look at the runway was prompted.

On the scene, investigators found that the runway touchdown zone markings had been painted, repainted, and painted again, ad nauseam. As a result, the markings had developed a paint build-up that was slipperier than the proverbial owl stuff, when wet.

Steps are underway to correct the situation at this particular base, but the same conditions could exist at many other places. It's something to think about the next time you start an approach to a wet runway.

Ominous Oil

A C-141 was being preflighted for a local training mission when the engineers noticed red fluid running from the oil filler caps on engines 1, 2, and 3. According to the aircraft's forms, the engines had been serviced with 24 quarts of oil after the last flight, but a check of a trash can at the aircraft's wingtip showed 28 empty hydraulic fluid cans and no empty oil cans! The suspicious sergeants wrote the aircraft up for suspected contamination of the engine oil with hydraulic fluid.

Happily, their suspicions were unwarranted. The engines had been serviced with a type of oil (Mil 7808F) which has a tendency to turn red when exposed to air. A complete check of the engine oil systems found no evidence of hydraulic fluid.

We're not saying the engines couldn't have been serviced with hydraulic fluid — just that they weren't this time. And we salute the sharp sergeants for taking the trouble to make sure.

A Question or Two--For You!

In January we ran an article called "The Numbers Game." Here is a very short version of the same. The questions are below; possible answers are listed on the next page.

Have fun!

Questions

C-5 Navigator	T-39 Pilot
1. 70; 200; 300	1. 720
2. 22.5	2. 6
3. 50	3. 5

A Question or Two--

Answers

C-5 Navigator

1. The three transmit-receiver modes available on the C-5 tacan set.
2. The number of degrees added to the reference AHRU heading when IMU heading is lost with IMU selected on the HAMS panel.
3. The MMR antenna scan rate (in degrees per second) with "S" slow position selected.

T-39 Pilot

1. If exhaust temperature exceeds 720 degrees, shut the engine down.
2. Speed brake open will decrease ground roll by 6 percent.
3. Reduce Pt_5 by 5 percent with engine inlet anti-ice on.

Wretched Radar

Two recent incidents re-proved that radar vectors are only an aid — not a cure-all.

In the first case, a C-141 was returning from a local training mission and maintaining 9,000 feet while being vectored toward the base. Center told the crew to turn from a heading of 240 degrees to 170 — which would have headed them directly toward a mountain 14,450 feet tall! The crew's ever-alert navigator (naturally) caught the error before there was any real danger, and appropriate corrections were made.

In the second case, an aircraft was in the GCA pattern, abeam the airfield at 2,000 feet, when the controller informed the pilot that his position was 5 miles from the runway and on glide path! Again the error was detected before there was any real danger, but the lessons are plain.

Nothing — not even radar vectors — relieves the aircrew of the responsibility for navigating their aircraft. For a glimpse of what can happen if they don't, check "Mishaps With a Moral — Three of a Kind," in the December 1970 issue of your favorite flying safety magazine — THE MAC FLYER.

Surveillance Snafus

Air Force Communications Service recently completed an analysis of unsatisfactory ASR approaches. Only 8 percent of the bad approaches were caused by equipment problems. In contrast, a whopping 65 percent were caused by controller errors, while another 27 percent were attributed to "unknown causes." The last two factors are especially interesting.

The approaches which were unsatisfactory due to unknown causes were usually ones where the aircraft wound up at minimums, outside of tolerance for no apparent reason. Tactfully, the report didn't mention any possible causes, but we wonder if pilot technique might have been a factor.

The controller error category, which accounted for the majority of the poor approaches, could be reduced by giving the controllers better training and more practice in ASR procedures. Are you getting the message yet?

Controllers could use more ASR approaches and we believe pilots could too. Think about it the next time you run the descent checklist. Do you really need another ILS or precision GCA? Some day, ASR might be the only thing you've got going for you. Do your part to make sure it will let you down without fouling you up.

Curious Cause

Lightning, hail, and heavy rains manage to damage several aerospace vehicles every year, and it's always pilot error — right? Well, maybe not! An encounter with a thunderstorm last summer proved different. The airplane came out second best, but the thunderstorm got tabbed with the primary cause, not the pilot. Seems the pilot did everything right, but his machine still got zapped by lightning, destroying the radome. We suggest that you not depend on having such an understanding investigator.

Rings Reconsidered

We've heard that some aircrew members are sporting metal rings, about one inch in diameter, on their flight suit and boot zipper pull tabs — presumably to facilitate opening and closing operations. While we'll admit these operations must sometimes be carried out in haste, we question this solution to the problem.

These rings — like finger rings (or earrings, if one wore them) — could easily catch on parts of the airplane or cargo and cause all sorts of problems.

We have to classify them — along with some other problem solutions we've seen — as potentially more trouble than the problem they're designed to cure. Do you really have to get your boots on that quickly?

after deadline.....

RETURN OF AN OLD FACE -- From April 1955 through the summer of '66, a column entitled "After Deadline" appeared somewhere in these pages. Then, like a handy but outdated tool, it was retired. Once again we feel that saving some space for last minute items is a good idea, so we welcome this old friend back.

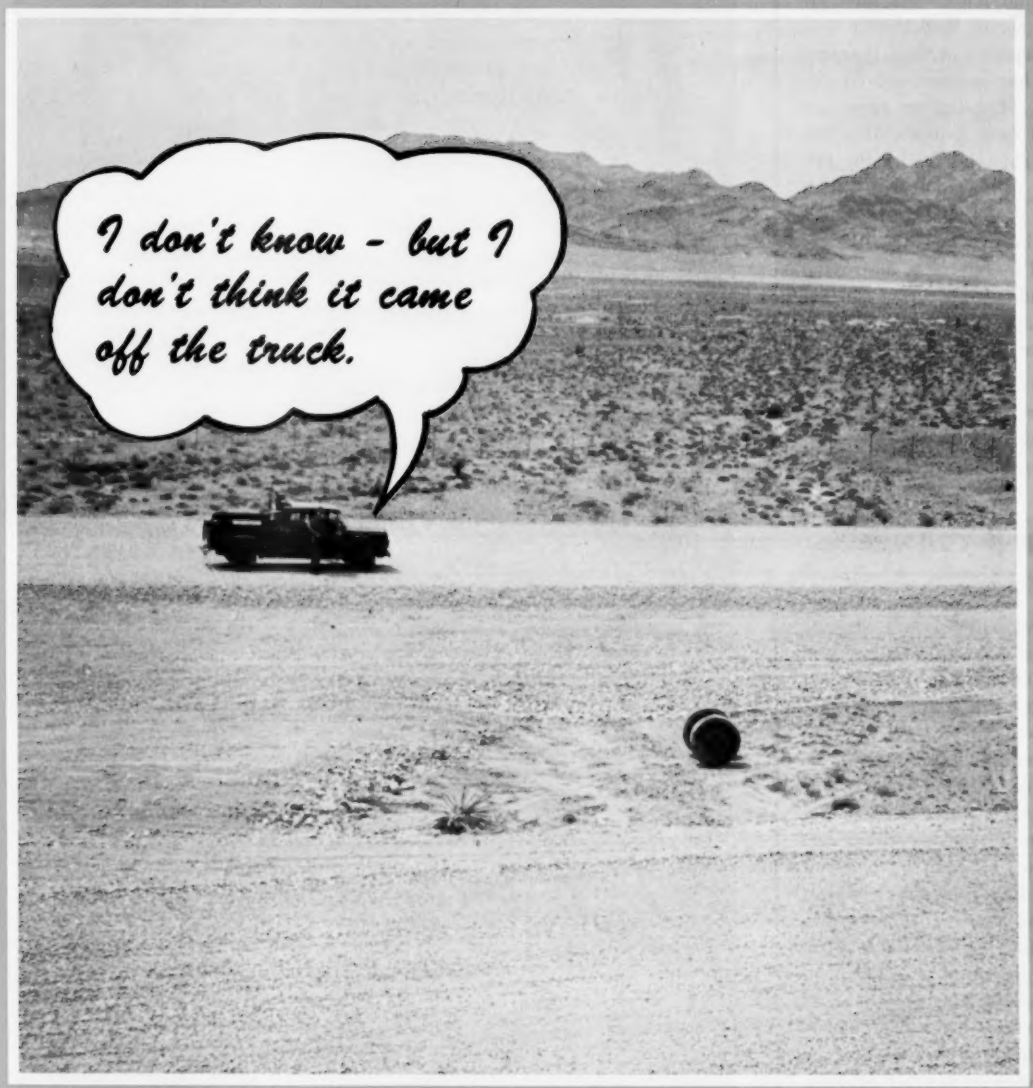
SWIFT RETRIBUTION -- We thought we'd share a bit of April Fool humor with you in last month's issue, so we ran a short bit presenting one man's view of a contemporary subject: women's lib. As luck would have it, our printing contractor's lady bookbinders chose to strike while that issue was being put together, thus causing us some delay and just a touch of chagrin. Ah, it's hard to get away with anything these days.

SUNBURN TIME AGAIN -- Those of us who have languished in the snow and gray-sky country are welcoming the warmth of spring and early summer. However, it's easy for us to overdo the sunshine bit -- and warnings about sunburn are still true. One special thought for aircrews: according to one flight surgeon's manual, spending a couple hours lying on a white beach without sunglasses can reduce your ability to dark adapt for as long as 36 hours. Better to have less tan and a longer life.

DISCLAIMER -- "An Airline Pilot Looks at Crosswind Landings on Slippery Runways," one of our three major landing articles in February, was written by Captain John B. Clark. While it is true that Capt Clark is an employee of American Airlines, we failed to point out that the article presented the views of the author only, and that it was not endorsed as official American Airlines policy.

COMING ATTRACTIONS -- The June issue of The MAC Flyer will feature a discussion of helicopter egress systems, a special look at a mission support accident, and two articles on violent weather. Also, the winners of the Writing Contest will be announced, and C. R. Terror will make a special photo mission and wind up with a bit of overexposure.

the ANALYZER



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